

SANIFAC

Establishment of erodibility indices and soil and nutrients losses from forest soils

PROJECT TEAM

Dr Michael Rodgers, NUI Galway*

Dr Liwen Xiao, NUI Galway

Mark O'Connor, NUI Galway

* Address correspondence to:
michael.rodgers@nuigalway.ie

COMPLETION DATE

July 2008

OBJECTIVES

- Establish the erodibility indices of at least six vulnerable forest soils – disturbed and undisturbed.
- Quantify the amount of sediment and nutrients leaving flume soil slabs during simulated flood events.
- Develop models from the flume data to estimate the amount of sediment and nutrients discharged from the Burrishoole catchment and compare this estimate with the results from the COFORD/EPA field study.
- Examine the effects of buffer strips and nutrient adsorption materials in the flumes.

- Assess the Forest Service *Forestry and Water Quality Guidelines* using results from this flume and field work.
- Continue to monitor the flows, and sample the waters for sediment and nutrient analyses in the SILTATION project area.

PROGRESS

A steel flume, 225 mm deep x 225 mm wide and 3 m long (Figure 1), is used in this study to simulate the overland flow process and to compare the effects of flow rate, slope and disturbance on the erosion of the Irish forest soils. Slabs of peat, of depth 200 mm, were excavated carefully with minimal disturbance from between the brash windrows at the Burrishoole study site, and placed directly into the flume. After saturation for 24 hours, tap water was pumped to a small reservoir at the head of the flume and from there it passed over a flat weir, the crest of which was 10 mm above the surface of the soil slab. The weir ensured an even distribution of the flow over the width of the sample. Runoff samples from the exit of the flume were taken every two to four minutes during a one-hour



Figure 1: The flume testing.

period. The samples of the runoff were tested for suspended sediment in accordance with the Standard Methods (APHA 1995) using Whatman GF/C (pore size 1.2 μm) filter paper. Figures 2 and 3 show the suspended sediment concentrations and the sediment loads released from the peat and sandy soil under different controlled conditions. For the slope of 15 degrees and a flow rate of 0.046 l/s, very little sediment was lost from the undisturbed peat; the maximum concentration and total loss were 5 mg/l and 0.037 g, respectively, during the one-hour test period. Under the same slope and flow conditions, substantially more sediment was washed away from the sandy soil; the maximum concentration was greater than 5100 mg/l and more than 200 g sediment was released.

ACTIVITIES PLANNED

- Soil samples from other forest catchments will be tested using the flume to establish their erodibility indices.
- Data collected from the flume study will be used to develop models to estimate the amount of sediment released.
- Continue to monitor the flows, and sample the waters for sediment and nutrient analyses in the Srahrevagh study area.

OUTPUTS

Michael Rodgers, Liwen Xiao, Mark O'Connor.
Phosphorus and sediment release from a forest catchment in Burrishoole, Co Mayo. EPA Annual Conference. The Royal Hospital, Dublin. (February 6 – 7 2008) – Poster.

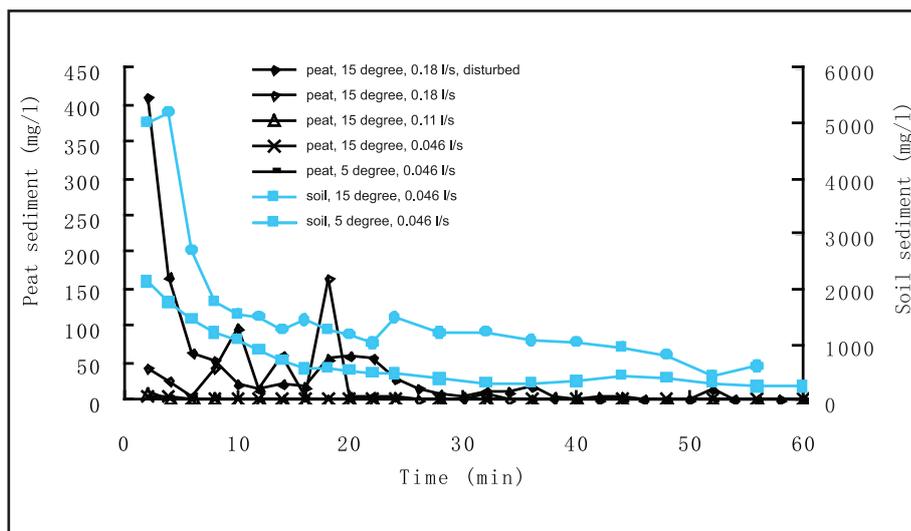


Figure 2: The suspended sediment concentrations recorded in the test.

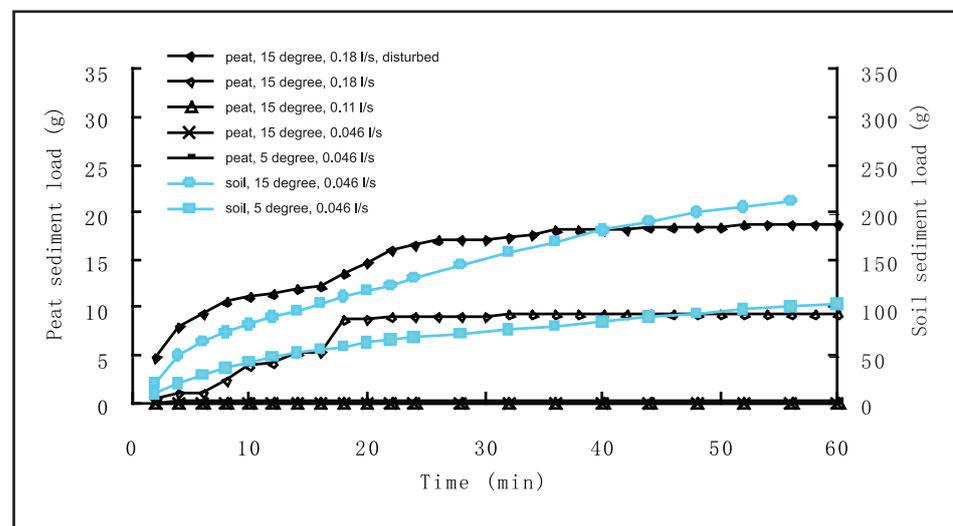


Figure 3: Sediment loss against time.